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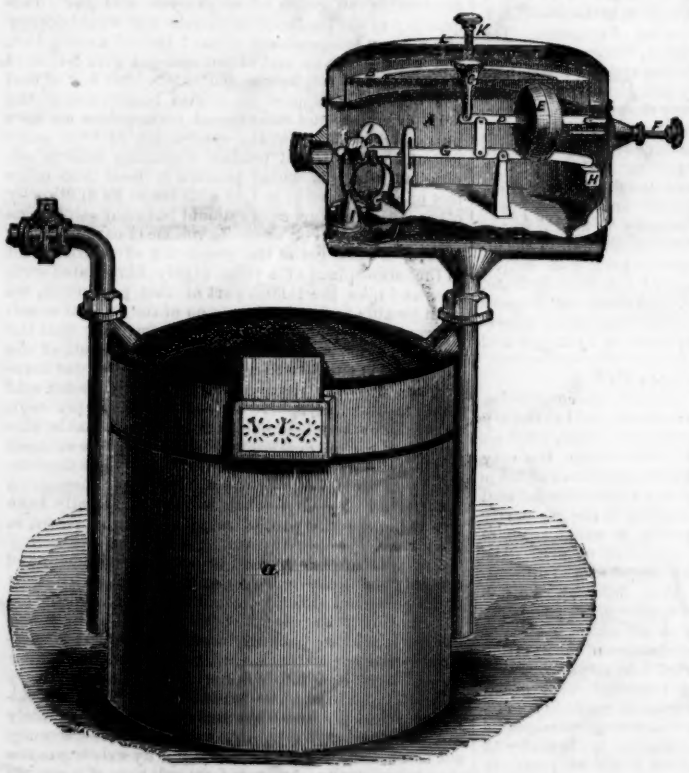
Beggs' Gas Regulator.

Few persons realize the importance of some cheap, simple, and efficient device to regulate the pressure of gas in service pipes, to the proper standard for securing a bright and steady light, with an economical use of the same. Gas, when burning under too high a pressure, is forced so rapidly through the burner into the atmosphere, that sufficient time is not given for it to mix properly with the oxygen of the air, until at least a large portion of it has passed beyond the influence of the heat derivable from the blaze, by which it should be ignited; that portion consequently passes away unburned, and is of course wasted. But under a proper pressure the gas is all consumed, and the intensity of the light greatly increased.



BEGGS' GAS REGULATOR.

When the gas is first turned on the proper degree of pressure may readily be obtained. But if turned on early in the evening, the numerous additional burners subsequently lighted and fed from the same street main, so reduces the pressure as to cause an imperfect light; again, if the quantity of gas is increased by turning off a portion of the burners, the pressure will be so great that much of the gas will pass away unconsumed. Thus these changes take place from hour to hour, as the number of lights in any given neighborhood are increased or diminished. You must therefore either be constantly regulating your gas, or your lights will be defective or unsatisfactory. The only practical way to remedy this evil is by some arrangement which shall be sufficiently sensitive, and at same time have sufficient power to regulate the working.

Mr. Eugene Beggs, of San Francisco, after considerable study and experiment, has finally succeeded in devising an apparatus which seems to accomplish this purpose most perfectly. This apparatus is connected to the meter, and acts as a perfect governor or regulator to the flow of the gas, and consequently to the pressure with which it enters the burners. When a single burner, of many that may be lighted, is turned off, or an additional one turned on, it is quite surprising to witness how quickly this sensitive and automatic device adjusts itself to the decreased or increased demand for the illuminating medium. No human hand could more quickly or accurately adjust the subtle fluid to its accidental disturbance.

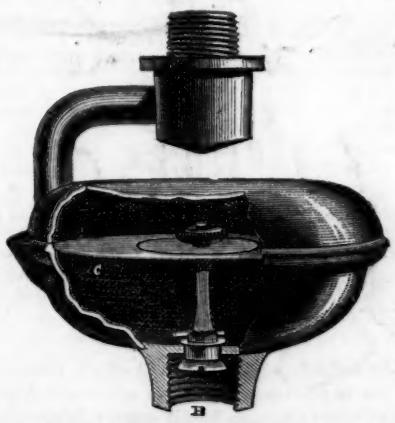
We give herewith a sectional view of this regulator, showing its connection with the outlet pipe of the meter, and exhibiting the interior arrangement of the device. By referring to the engraving, *a* represents the meter, and A the case of the regulator. B is the diaphragm, which in this apparatus is made of a flexible metallic substance, instead of oiled silk, leather, etc., which allows the gas to escape through its pores. By the use of metal all leakage is avoided, while the requisite delicacy of movement is secured. The diaphragm B has the post C passing through its center and attached to the end of the lever D. This lever is connected with the lever G by a link as shown, and the valve J is attached to the long run of the lever G, so that by the intervention of the series of levers, a very slight motion of the diaphragm very sensibly affects the valve. The lever G has at the opposite end from the valve a counterpoise H, and the lever D carries the adjustable weight E, which is operated by a rod F passing through a stuffing-box on the side of the case. By means of this rod the weight E can be moved along the lever D to any point, and when once adjusted to any desired number of burners needs no further attention. A curved lever I is attached to a standard beneath the lever G, and has its short arm attached to the lever by a link. The opposite end of the curved lever passes over the top of the lever G, and carries a weight which moving backward and forward, is increased or diminished in its effects by being carried further from, or brought more directly over its centre of gravity, and thus equalizes the pressure, whether a larger or smaller number of burners are used. The screw K is designed to stop the action of the regulator when desired. When screwed down it impinges upon the nut on the top of the post C, by which the diaphragm is forced down, and the valve J opened to its fullest extent, allowing the gas to pass through, as though there was no regulator attached. The object of this arrangement is to readily determine, whenever anything is out of order, where the fault lies, without removing the regulator.

The advantages claimed by the inventor for this over other regulators, are as follows:

1st. No liquids of any kind are used to seal the gas, which liquids always require attention when used.

2d. There are no drips or places for the water and tar to accumulate, which will put out the light if not drawn off in time.

Fig. 2.



REGULATOR FOR STREET LAMPS.

3d. It is easier regulated, as no extra weights are required.

4th. In changing the meter, it can be taken off and replaced without interfering with its working.

5th. It is the only dry regulator which increases the weight on the diaphragm as the greater number of burners are required.

6th. It is the most sensitive, as a large surface is allowed for the gas to act upon.

7th. The valve never draws up tight to the valve seat, but always hangs loose, which will prevent it from sticking fast.

8th. The gas can pass through without the regulator working, and any one can attend to it, by turning the screw on the top of the case.

9th. It is the cheapest and most durable, as well as the easiest to set to work.

The inventor also claims that it is by no means uncommon for a saving of 30 per cent. to be effected by its use, and still retain the same amount of light.

Fig. 2 represents a small compact regulator for single burners and street lamps, the burner to be attached at the top. The case contains the diaphragm and suspended valve as shown. B is the inlet, C the outlet.

It requires no argument beyond the mere statement of facts as given, to prove the value of such a device as we have described. This apparatus appears to overcome the objections which have been urged against the two or three other devices which have been previously introduced to the public, to meet the want of a gas regulator. The public are respectfully invited to call and examine the apparatus in operation at the office of this Journal, 22 Pine street.

In connection with the above description we publish the following correspondence:

(Copy.) SAN FRANCISCO, July 27, 1868.

James R. Smedberg, Esq.,
Eng. San Francisco Gas Co.

Dear Sir: May I ask you to give me, first, your opinion of the value of regulators for street lamps, and second, the results of some experiments which, as I understand, you have recently made to test the value of a lamp governor invented by Mr. Eugene Beggs, of this city.

Very truly,
DAVID BUSH.

ENGINEER'S OFFICE,
SAN FRANCISCO GAS COMPANY,
July 28th, 1868.

David Bush, Esq.,
San Francisco, Cal.

Dear Sir: In reply to your first inquiry of yesterday's date, I can best say that all the records of British Engineering fortify my own position—a position based upon the value of lamp governors, as giving equal average candle-power under conditions involving less waste of gas.

As to your second question, which has specific reference to the lamp governor devised by Mr. Eugene Beggs of this city, I must depart from what has been a usual rule of mine so far as to say that, from tests of my own I consider it as fully equal (perhaps superior) to any with which a study of nearly twenty years has made me acquainted.

In the essential points of a diaphragm of completely flexible, yet incorrodible metal, as against permeable leather, and of exquisite sensibility of action I am satisfied that no device can be its superior. I take the liberty to submit the following statement of tests in support of my opinion, the candle-power being nearly equal, and the regulator having been in work for six months.

Pressure.	Cons'r without Regulator. Feet per hour.	With Regulator. Feet per hour.
5–10	2.010	2.235
10–10	2 940	2.490
15–10	3.660	2.655
20–10	4.365	2.565
25–10	4.800	2.565

The trifling nature of the variation shows that it would have been obviated if the governor had been adjusted to a heavy pressure, such as work most high-level lamps.

Very truly yours,
JAMES R. SMEDBERG,
Engineer San Francisco Gas Co.

☞ State and county rights for sale.

Desulphurizing Coal.—Mr. Charles F. Dennet, who for twelve years was the active agent of Colt's Fire-arms Factory Company in this country, is about introducing a new method for the treatment of coal, which has been pronounced a decided success. The coal prepared by the new process, which is very simple and cheap, is said to be far superior to coke for melting iron, etc. A much better fire can be made with it than with coke. Cast-steel heated by coal thus treated has been welded without the use of borax or other ingredients. Pig-iron, which has been proved too hard, has been found to yield and produce as good work as turned out with some of the best brands of iron. Crystalized iron, after melting once or twice in a cupola with the desulphurized coal prepared by the new art, has been found to work exceedingly well. The whole apparatus and ingredients to treat 100 bushels of coal can be put up for from £5 to £10, and it is stated that sixty bushels prepared by this process give as much heat as eighty-five bushels of the best coal not so prepared. The coal burns with a bright and violent blaze, and for family use effectually gets rid of the smoky smouldering fires, and substitutes one of a bright and cheerful character. To smiths and manufacturing establishments, where large and strong fires are kept up, it is proposed to grant rights for usage at such low rates as to ensure its general adoption, and do away in a great measure with the smoke nuisance so injurious everywhere.—*London Mining Journal.*

On Some of the Constituents of Coal Gas

A Lecture by Dr. ODLING, F.R.S., F.C.S., etc., before the British Association of Gas Managers.

[From the Journal of Gas Lighting.]

(Concluded from p. 82 of the American Gas-Light Journal.)

With regard to the chemical nature of disulphide of carbon, it is an anhydrous sulphur acid, comparable, as I have said, with anhydrous carbonic acid. It unites with basic sulphides, including sulphide of ammonium, just as carbonic acid unites with basic oxides, including aqueous ammonia. Thus sulphide of carbon vapor, CS_2, is absorbed by sulphide of ammonium solution $(NH_4)_2 S$, with production of sulphocarbonate of ammonium $(NH_4)_2 OS_2$, corresponding to neutral carbonate of ammonium $(NH_4)_2 CO_3$. When this sulphocarbonate of ammonium is exposed to the action of heat or of free ammonia, it loses sulphuretted hydrogen and is converted at first into a salt called the sulphocarbamate of ammonium $(NH_4)NH_2 CS_2$, and eventually into the sulphocyanate $(HN_4)NCS$, which is a tolerably stable compound. This sulphocyanate is also the principal product of the reaction of disulphide of carbon with free ammonia, as explained by the following equation:

$$2NH_3 + CS_2 = (NH_4)NCS + H_2 S.$$

With the fixed alkaline hydrates and sulphydrates, sulphocarbonates also are formed, which are, like the ammonia salt, but, unlike it, do not change into sulphocyanate. Availing ourselves of these reactions, disulphide of carbon may be removed from small quantities of gas by passing the gas through aqueous ammonia or potash, or solution of sulphide of ammonia (gas liquor) or of sulphide of potassium or calcium (gas lime. But, owing to the insolubility of the disulphide in water, and its small proportion in the gas, its complete removal on the large scale by these means is quite impracticable, the impure gas having to remain for so long a time in contact with so large a surface of the absorbant, as I explained to you when treating of ammonia. The disulphide being soluble in alcohol, better results on a small scale are obtained by passing the gas through an alcoholic instead of a watery solution of potash. In this case the salt produced is not the simple sulphocarbonate of potassium, $K_2 CS$, analogous to the carbonate, $K_2 CO_3$; but it is the ethyloxisulphocarbonate, better known as the xanthate of potassium, $K(C_2 H_5)CS_2 O$, or $KEtCS_2 O$. The solution of this salt gives a yellow precipitate with sulphate of copper, and a black precipitate with acetate of lead, especially on gentle warming. Another chemical property of disulphide of carbon is its reaction at a moderate heat with water, whether in the form of steam, or of a definite hydrate, as that of calcium (slaked lime). At about 400 degrees a reaction of this kind takes place, though only imperfectly, with production of sulphuretted hydrogen and carbonic acid—

$$CS_2 + 2 H_2 O = CO_2 + 2 H_2 S.$$

As regards the products of the complete combustion of disulphide of carbon, I have already said that they are the carbonic and sulphurous acids. Now, sulphurous acid, which, in a greatly diluted state, is a very harmless substance, altogether different from sulphuric acid, is a constant product of the combustion of coal gas, and is derived from the presence in the gas partly of disulphide of carbon, and partly, it would seem, of other sulphur compounds of a similar nature. The proper mode of estimating the proportion of the sulphur existing in coal gas, in these different forms, is now, as you know, a subject of controversy. One party maintains that we ought only to estimate the amount of sulphur which, during the combustion of the gas from an ordinary burner, is converted into sulphurous acid—this sulphurous acid being regarded with great, though unwarrantable, alarm, from its possible conversion into sulphuric acid, which is alarmingly designated oil of vitriol. Now, if this estimation could really be made, it would, I am inclined to think, be perfectly sufficient; but as a matter of fact it is quite impracticable to estimate the amount of sulphurous acid produced by the combustion of gas—burning the gas as it is ordinarily burned for purposes of illumination. When it is attempted to measure the amount of sulphurous acid produced by the combustion of gas, the gas is necessarily burned in a special manner, usually at the rate of about three-quarters of a foot an hour, with a non-luminous flame, and under conditions cannot be, or at any rate have not been, specially defined.

Another party, with which I confess I am disposed to agree, says—"Take the bull by the horns, admit the worst, estimate by any efficient means the total quantity of sulphur contained in the gas, and declare it." Now, it is quite certain that if we take sufficien time and pains, we can estimate the absolute amount of sulphur existing in gas with reasonable certainty. But the Act of Parliament, having reference to the amount of sulphur indicated by the sulphurous acid formed in the combustion of the gas, as I have previously referred to, declares that the amount of sulphur existing in the gas in every form shall not exceed 20 grains in 100 feet. But this provision of the Act is habitually and necessarily set at defiance. Not unfrequently the gas supplied in London furnishes, by its combustion, a quantity of sulphurous acid equivalent to slightly more than 20 grains in 100 cubic feet;—and I think I may say that it almost invariably contains an absolute quantity of sulphur exceeding 20 grains in 100 feet, which, so far as I know, it is quite impracticable on the large scale to remove. What is the average amount of actual sulphur contained in London gas I cannot tell you, but I believe it is nearer 30 than 20 grains in 100 cubic feet. I might here direct your attention to the very ingenious instrument devised by Mr. Valentin for making an absolute determination of the sulphur contained in gas, which gives much higher results than are furnished by Mr. Lewis Thompson's and Dr. Letheby's instruments. Mr. Valentin has kindly lent me the instrument for exhibition here this evening, and, being present, will, I am sure, be happy, at the conclusion of my lecture, to explain its construction to any gentleman interested in the subject.

So far, then, I am a little at issue with gas managers in being disposed to admit that ordinary coal gas contains a greater amount of sulphur in some form or other than they are willing to allow, and than the letter, though not the spirit, of the Act of Parliament permits; for the Act was framed upon the results furnished by an incomplete combustion of the gas and condensation of the products. But, on the other hand, I am altogether at issue with the public, when they maintain that the sulphur of gas produces, by its combustion, oil of vitriol, or that the amount of sulphur ordinarily contained in gas is of any consequence whatever; and a little consideration will, I think, satisfy you of the soundness of this position. We will assume that coal gas contains, not 20, but 40 grains of sulphur in 100 feet—a quantity, at any rate, greatly exceeding the reality. Now, making another extravagant assumption, that the whole of these 40 grains of sulphur would be completely burnt—and in reality they would be burnt very incompletely—they would furnish by their combustion 80 grains of sulphurous acid gas This quantity of the produced sulphurous acid would occupy at ordinary temperatures about 1-15th of a cubic foot, and since 100 cubic feet of our coal gas give 1-15th of a cubic foot of sulphurous acid, 1500 cubic feet of coal gas would be required to furnish 1 cubic foot of the acid, even upon the extravagant assumptions we have purposely made. But the combustion of 1500 cubic feet of coal gas would produce something besides sulphurous acid. It would produce at least 1000 cubic feet of carbonic acid; and, in addition to its dilution by other gases and vapors, we should have our sulphurous acid diluted by 1000 times its volume of carbonic acid. Now, if we can get at the proportion of carbonic acid in the atmosphere of a room highly illuminated with gas, and take the 1000th part of that proportion, we shall be able to form some notion of the amount of sulphurous acid present. You will remember that the amount of carbonic acid furnished by the breath of one individual is equal to that furnished by 3-feet gas burners, and that the maximum amount of carbonic acid found in the atmosphere of theatre was ·32 per cent. Now, if in addition to our previous unreasonable suppositions, we further suppose an atmosphere contains 2 per cent. of carbonic acid furnished by gas combustion, you will see that the whole matter becomes a *reductio ad absurdum*—that we might actually have one half-millionth part of sulphurous acid present in the air of a gas-lighted room.

But this sulphurous acid is not sulphuric acid, and can only be converted into sulphuric acid with very much pains and difficulty, as all who have tried the experiment of converting the sulphur of coal gas into sulphuric acid are painfully aware. When gas is burned inspecial apparatus, indeed, its constituent sulphur can be converted into sulphuric acid; but it is very difficult to do this. The probability is that of the sulphurous acid produced in ordinary combustion scarcely a particle gets converted into sulphuric acid—certainly not more than the ammonia ordinarily existing in the air can neutralize, so as to form sulphate of ammonia instead of sulphuric acid; and with this conclusion, gentlemen, I bring to an end what I have to say to you respecting those constituents of coal gas which do not contribute much to its illuminating power.

Interesting Experiment with Hydrogen.—M. Cailletet announces the extraordinary circumstance that hydrogen will pass through iron even at the common temperature on certain conditions. He caused two thin iron laminæ to be welded together round the borders, so as to form a large artificial blister. To this was welded a thin tube establishing a communication with the hollow space left between the two plates, and the whole apparatus so constructed was plunged into a bath of dilute sulphuric acid. The numerous bubbles which escaped through the open extremity of the tube being collected in a receiver, were ascertained to be hydrogen.

Observations Upon the Combining Powers of Carbon.

At a meeting of the Chemical Society of London, on the 21st May, 1868, Mr. W. H. Perkin read a paper on the above subject. The author addressed himself to the inquiry whether all four affinities, or combining units of carbon are of equal value, and examines with this object the constitution of a great number of carbon compounds both simple and complex. Mr. Perkin concludes that that the combining units of carbon are arranged in two pairs of very widely different chemical values, and proposes to indicate this difference in formulæ by drawing two thick lines for the stronger, and two thin lines for the weaker affinities. He deduces this conclusion from the fact that iodoform loses but two out of its three atoms of iodine when acted upon with bromine, or distilled with chloride of mercury, thus:

$$\left\{\begin{matrix}I\\I\\I\\H\end{matrix}\right. + BrBr = C\left\{\begin{matrix}Br\\Br\\I\\H\end{matrix}\right. + HI.$$

and

$$C\left\{\begin{matrix}I\\I\\I\\H\end{matrix}\right. + HgCl_2 = C\left\{\begin{matrix}Cl\\Cl\\I\\H\end{matrix}\right. + HgI_2$$

In a similar way disulphide of carbon, when attacked by chlorine, gives an intermediate product, thus:

$$C\left\{\begin{matrix}S\\S\end{matrix}\right. + Cl_6 = C\left\{\begin{matrix}Cl_2\\S\end{matrix}\right. + SCl_4$$

Mr. Perkin's views may be well illustrated by quoting another example, one of many described in his paper, thus:

$$\underbrace{\overset{Cl}{\overset{|}{C}}=O}_{\text{Phosogene gas.}} + \underbrace{\overset{Et}{\overset{|}{O}}-\overset{H}{\overset{|}{}}}_{\text{Alcohol.}} - \underbrace{\overset{EtO}{\overset{|}{C}}=O}_{\text{Chlorocarbonate of ethyl.}} + HCl.$$

In the instances of carbonic oxide and ethyleoe, where the carbon affinities are not satisfied, the author suggests that in these bodies the stronger units are in combination with O and H_2 respectively, and the weaker gains are neutralised by virtue of a kind of polarity, thus:

$$\underbrace{\begin{matrix}-|\\C=O\\+|\end{matrix}}_{\text{Carbonic oxide.}} \qquad \underbrace{\begin{matrix}-|\\C=H_2\\+|\\-|\\C=H_2\\+|\end{matrix}}_{\text{Ethylene.}}$$

The following experiments were shown by Mr. Perkin. Some dry oxalate of silver in a test tube was brought into contact with chloride of benzylene; when the action had commenced, at first slowly, a delivery tube was adapted and the evolved gases collected over water were shown by appropriate tests (potash absorption and inflammation of the residue) to consist of a mixture in equal volumes of carbonic acid and carbonic oxide. A comparative experiment was likewise made for the purpose of showing the difference in the action of sodium alcohol upon chloride of benzylene, and chloride of benzyl in alcoholic solution, both being heated by immersion in boiling water; the latter soon gave a copious deposit of chloride of sodium, whilst the contents of the other tube remained clear. The difference in the behaviour of the two bodies was explained by assuming that the chlorine was tied to the carbon by a weak bond in the chloride of benzyl, and by a strong double union, or affinity, in the case of the chloride of benzylene. Their constitution was thus sketched:

$$\underbrace{\begin{matrix}H\\|\\C=Cl_2\\|\\(C_6H_5)\end{matrix}}_{\text{Chlor. of Benzylene.}} \qquad \underbrace{\begin{matrix}Cl\\|\\C=H_2\\|\\(C_6H_5)\end{matrix}}_{\text{Chlor. of Benzyl.}}$$

The author concludes his paper by stating his views in the form of three propositions:

1st. That the units of combination possessed by an atom of carbon consist of two pairs of greatly different values.

2nd. That the units of each pair are chemically of slightly different values; and that they appear to possess some kind of polarity, thus rendering it intelligible that two units of combination in one atom may neutralise each other.

3rd. That in poly-carbon compounds the weak units of combination of one atom of carbon may unite with the strong units of a second atom.

The president of the society moved a vote of thanks to Mr. Perkin, and invited an expression of opinion from Sir Robert Kane, Dr. Williamson, and others he saw in the room.

D. A. W. Williamson demurred in accepting the view put forward by Mr. Perkin, and considered that this was an example of the grave errors sometimes committed by chemists, when attempting to follow the path of Kekulé without heeding the pitfalls against which that author had specially warned them at the outset. It was a mistake to assume that when one atom of hydrogen in marsh gas was replaced by chlorine, and the new body, CH_3Cl, came in turn to be attacked by chlorine, that because a greater difficulty was experienced in the second replacement a different degree of affinity must necessarily be exerted between the carbon and one or the rest of the original hydrogen atoms. The fact was that at the first stage the properties of the body were entirely changed, and we have afterwards to deal with a new system, and the effects produced in the two cases have, therefore, no assignable relation one to the other. Taking a simpler case, that of water, H O H. When attacked by sodium a hydrate was produced, H O Na, which exhibited new properties; and when we proceeded further to replace the remaining atom of hydrogen in this hydrate it could not be said that we were at that moment dealing with water, nor could it be inferred that because one H left before the other was originally held in weaker union with the oxygen. Professor Williamson instanced other examples of hydrogen replacement, So_3 for H_2 in the case of hydrated sulphuric acid being formed from two atoms of water; and, then, whether one or both of the remaining hydrogen atoms were replaced by potassium, it was impossible to observe any difference, or imagine any distinction, between the two atoms of hydroxl, or of hydrogen, in these compounds. The speaker objected to the use of the words, "atomicity" and "bond," and said that although Kekulé protested at first against a wrong use being made of these terms, his mind seemed afterwards to have become warped by constant misapplication of them on the part of others, for he had come at last to use them himself in the sense against which he formerly objected.

Dr. Odling agreed heartily with all that Dr. Williamson had said, but still felt thankful to Mr Perkin for having brought the subject forward for discussion. The hypothesis which asserts that an atom of carbon is provided with bonds of which each has a specific function is not new, having been already described in "Watt's Dictionary of Chemistry" and discussed by Erienmeyer and others. It seemed to be necessary to wait for facts: Dr. Williamson had alluded to the two chlorides of methyl formerly supposed to exist and some chemists believed there were two bromides of ethyl. Referring to Mr. Perkin's illustrations, the four bonds of carbon instead of being extended at right angles would, if written in a straight line, be shown thus — C =, but in attempting to explain the constitution of carbonic oxide there was nothing to show whether the oxygen atom stood on the right hand or left; in either case there would be a hypothetical copulation of unsatisfied affinities.

Dr. Hugo Muller disputed the inferences drawn from the asserted impossibility of converting the chloride of benzylene into a tri-chlorine compound, the fact being that this could be accomplished by a continued action of chlorine.

Mr. Perkin, in reply, reminded his hearers that he had purposely abstained from the use of the word "bond," and employed throughout this paper the term "combining unit." Chloride of benzylene was produced by the action of pentachloride of phosphorus upon the oil of bitter almonds, and he was not aware that the chlorination of this product could be pushed further. He still wanted an explanation of certain facts; for instance, when the vapor of bichloride of carbon is passed through a red-hot tube it gives up part of its chlorine; but why does this happen if the combining units are of equal value? and again, why does carbon rob carbonic acid of half its oxygen?

A vote of thanks having been given to the author, the meeting adjourned.

A Very Pretty Experiment.—Take a sheet or piece of ordinary writing paper, say commercial note, and saturate it in a solution of bi-chromate of potassium, 1 ounce, with water, 3 ounces, and dry it in the sun. Cut the paper into squares of about three inches, and double them back and forth until the form—a zigzag section—will stand on a table and ignite the top of the slip. The result will be a slow combustion, the products of the combustion growing out of the edge of the paper like spears of grass and curling over to represent very faithfully the curving and depending leaves of the palm and cane. If the process is carried on without drafts of air the final result will be a bunch of beautiful blue-green filaments, while the process of combustion itself will prove a means of pleasant recreation.

The New York Society of Practical Engineering.

[REPORTED FOR THE AMERICAN GAS-LIGHT JOURNAL.]

This society met last evening, Sept. 13th, at their room, No. 24 Cooper Institute, Mr. James A. Whitney, President, in the chair. The subject for discussion was "Elevated Railways for City Travel," and a full and and exhaustive paper on this topic was read by Mr. C. Williams, C. and M. E.

The writer considered at some length the prominent plans before the public for the relief of our crowded business streets, such as Broadway, South, West, and other streets of this city, including the Underground, the Elevated Railway through blocks, on arches, the Suspension Railway, the so-called Atmospheric plans, and the Single Column elevated railway. With regard to the first-named system the writer reiterated the well known objections of the great expense of construction and length of time required to complete the work, and referred to the fact that a greater part of the distance would have to be tunneled through solid rock, and at one point, at least, below the line of high tide (?) The objections of great expense and length of time required also hold good against the plan of Elevated Railway through blocks, and, in fact, this plan the writer deemed the most expensive and least practicable of all, as the enormous expense which would be necessary for the purchase of the right of way would, it is thought, more than cover the expense of *widening* the street for the same distance. The plan of elevated railways on arches, whether of one, two, or three tiers, was believed to be more feasible, although more cumbersome and obstructive. The suspension plan was more feasible, but objectionable on account of the obstruction of the street.

The so-called atmospheric plans were recommended as a means for the transportation of freight, but much doubt was expressed as to their economical adaptation to the conveyance of passengers. The single column elevated railway, of which an example is seen in the Greenwich-street line, was believed to be more economical in its construction, and at the same time to offer less obstruction to the street, either in its construction or operation, than any of the other plans brought prominently before the public; but it is believed by many that its construction is not as perfect as should be required in structures of this kind, and that the application of the motive power must sooner or later be changed to some more practical method of propulsion. The writer concluded by suggesting a plan of a "Combined Elevated Railroad and Streetway," devised by himself, for which he claimed the greatest economy of materials and consequent cheapness, combined with a greater adaptation to the requirements of the public. The essential features of this plan consist is a flooring the whole width of the streetway, supported upon truss girders, and accessible by suitable stairways; this flooring carries the rails upon which the cars move; on either side of the rails are sheltered sidewalks, and from these light aerial bridges may connect with the second stories of the houses, making them available as stores; the flooring may be composed of glass grating, to admit light to the street below, the space over the ground sidewalk is left open to prevent interfering with light and proper ventilation.

It was claimed that this plan would furnish clean, well ventilated, sheltered sidewalks, and better accommodation for quick travel than any other plan suggested, and that it would relieve the lower street of the greatest proportion of pedestrians and passengers, thereby increasing its capacity for the passage of vehicles. A modification of this plan was also explained which would not be so great an innovation nor so expensive, and yet retain most of the advantages of the original device, and possess far more popular features than any of the plans heretofore proposed. It consisted in leaving out the flooring of the central space between the elevated sidewalks, and locating the trackways in or upon the roofs of the elevator walks.

In the discussion which followed the reading of the paper Mr. L. Holms inquired how it is proposed to prevent the accumulation of snow on the tracks, to which it was replied that the latter should be raised above the flooring to a height slightly more than the usual depth of snow. In the consideration of different plans of propulsion, Mr. Holms remarked: Some years since, when the present system of surface railways was first set on foot, I proposed a plan of propelling the cars by engines worked by compressed air. The air was to be contained in iron cylinders arranged under the seats out of the way, the cylinders to be replenished at intervals from reservoirs filled with compressed air by stationary engines. This is perfectly feasible. Experiments made in England about the same time, demonstrated that wrought iron cylinders of small diameter, say about eighteen inches, and three-eighths of an inch in thickness would bear air compressed to a pressure

of from four to five thousand pounds per inch. Cylinders of suitable but convenient size filled with air at this pressure would enable cars to be driven comparatively long distances without stopping.

Dr. A. W. Hall.—About fifteen years ago I witnessed the experiments of Prof. Solomon in Cincinnati in his attempts to produce an engine worked by carbonic acid. He found that at twelve hundred pounds pressure the carbonic acid leaked through the iron vessels as through a seive. He varied his experiments by lining the vessels with lead, tin, and other metals, but the result was the same. The carbonic acid passed through the metal, and I doubt very much if air could be retained under the pressure mentioned by Mr. Holms, unless, indeed, different gases possess different powers of filtrating through the pores of substances.

Mr. Holms.—Twenty years ago the Portable Gas Company, of London, transported gas compressed in cylinders to a pressure of three thousand pounds. The cylinders were of iron and coated internally with some kind of varnish. The same Company used copper cylinders hooped their entire length with iron. Air may be held at even a greater pressure; I know that in the experiments I have just referred to air was compressed to four thousand five hundred pounds in iron cylinders only three-sixteenths of an inch in thickness, they were fourteen inches in diameter.

Dr. A. W. Hall.—To return for a moment to the compression of the gas in carbonic acid engines. I should like to know the greatest pressure to which carbonic acid has been subjected in liquefaction.

The President.—The liquefaction of carbonic acid is commonly assisted by cold artificially produced, and no definite pressure can be stated, as this will vary in different cases with the temperature.

Mr. Holms.—Speaking of the filtration of gases through metals, it may be mentioned that liquids under great pressure will pass through in the same manner. In the construction of hydraulic machinery I have forced water through the sides, six inches thick, of cast-iron cylinders. This was cured by an application to the interior of sal ammoniac, which, doubtless, filled the pores with a kind of rust. Rosin was found to secure a like result.

Dr. A. W. Hall.—If the carbonic acid can, by these means, be retained in a liquid form, it might be used as a substitute for compressed air in working the engines of a car.

T. P. Pemberton.—I would ask what objection exists to the use of Dummy engines, although comparatively little used. You can get rid of the cinders and smoke, and but little power is required.

C. Williams.—They might be used, but some of the other plans indicated in this discussion would be cheaper and better adapted to the public requirements.

Dr. A. W. Hall.—In the rope traction method employed on the Greenwich-street line, it is claimed that the ropes move and consequently start the cars at the rate of fifteen miles and hour. I believe this statement to be a bumbug. In this system the ropes are furnished with trucks moving on small wheels and arranged at about a hundred and fifty feet apart. The cars are started by throwing down a lever which catches upon one of the trucks and jerks the car into motion. It is claimed that the jar by the use of springs, but I consider this nonsense. It is impossible to start a heavy car from a state of rest to a speed of fifteen miles an hour without danger to the passengers and injury to the mechanism.

Wm. B. Harrison.—I have watched the Greenwich street enterprise from its inception with a great deal of interest, and from the beginning have predicted its failure. I have understood that the parties interested claim that the cars can be run at a speed of twenty to twenty-five miles per hour. This is simply out of the question. The ropes turning at right angles at the end of their circuits, the trucks would be thrown or torn out of place by their own velocity. You might as well try to turn a cannon ball at right angles to its path.

T. P. Pemberton.—The longest practical line of rope that I have ever seen was in operation in England some years ago. The train was started on a heavy inclined plane, the cars were attached to a endless rope which moved at a speed of about fifteen miles an hour, and worked very smoothly. The rope was started on a signal sounded at the opposite end of the line by compressed air passing through a tube extending the length of the line. I do not think that for the greater length of line in this city this plan would be found advisable.

Dr. A. W. Hall.—Something has been remarked concerning the variation of the pillar of the Greenwich street railway from a vertical position. A recent invention has been patented to secure the perpendicular adjustment of such pillars. This is done by a base furnished with set screws so that the pillar may be accurately plumbed.

A Member.—Inasmuch as this would involve the use of several thousand set screws to the mile, it is not likely that it will come very extensively into use. The best way to secure the desired position of the pillars is to place their bases or foundations below the reach of frost.

The hour for transaction of miscellaneous business having arrived, the committee appointed at a previous meeting reported that they had examined the Worthington, Hawley, Heaton's, Wagner's, and the Balanced Meter, together with drawings of the meters Starr and Woodbury, and had prepared a system for presenting in tabular form the comparative ratios of merit of the different meters when the final report of the committee shall be made.

A Mr. Jas. Harrison exhibited to the society an ingenious apparatus for cleaning the streets of snow in winter. A steam-carriage is furnished with endless aprons which carry the snow from the street upon a platform heated by the waste steam from the boiler. The snow is thus melted and passes off in the form of water.

The society adjourned to meet again at the same place on Tuesday Sept. 29, when a paper will be read and a discussion had upon "The Filtration of Water for Industrial and Household Purposes."

Heat in Mines.

The *Virginia City (Nev.) Enterprise* says: The increase in the heat of our mines is now beginning to give many of our mining companies more trouble, and is proving a great obstacle to mining operations in those levels lying below a depth of 1,000 feet than any veins or "pocket" deposits of water yet encountered. A number of the leading companies on the Comstock are now engaged in putting in engines to be used expressly for driving fans for furnishing air to the lower levels, forcing it through large tubes of galvanized iron. With this great increase of heat in our mines comes a great decrease of water; in fact, in our deepest mine—the Bullion, which has attained the depth of 1,200 feet—not a drop of water is to be seen; it is as dry as a lime-kiln and as hot as an oven.

In the lower workings of the Chollar-Potosi mine, which are a perpendicular depth of 1,100 feet below the surface, the thermometer now stands at 100 deg.—a frightful heat to be endured by a human being engaged in a kind of labor calling for severe muscular exertion. Here, also, we find the water to have decreased till there is at the present time a very insignificant amount, it being necessary to run the pump but four hours out of the twenty-four.

We might give other instances illustrative and corroborative of what we have stated, but deem the evidence afforded by two of our deepest mines, situated some considerable distance apart, sufficient. Does it not appear likely, judging from the present situation in the deepest levels of our mines, that the great Sutro tunnel, if ever constructed, is more likely to be found useful as a means of entrance for fresh air than of exit for water? The "situation," if we may so call it, so changes in our mines that we hardly know one month ahead what would be of advantage to us. Some months since we supposed we were to be drowned out of the lower levels of our mines, or rather prevented from ever attaining any very great depth, by a tremendous influx of water. Now we find no water at all—or at best a trifling quantity—but in its place hot air. No doubt this is a change for the better. It will be much easier to force a column of light and elastic air a thousand feet downward than to lift a column of water the same distance.

Should it prove a fact, as now seems probable, that the water in our mines is confined to a certain strata at no great depth from the surface, say between the depths of 400 and 900 feet, and should it be found practicable to ventilate the deep workings of our mines by forcing down air, some of our leading companies are likely to reach a depth much below the point where the Sutro tunnel will tap the lead before it is completed, even though work upon it should be at once commenced. Should the Chollar-Potosi Company continue downward with their shafts at the same rate of speed that has distinguished their progress for some months past, they would, in less than two years, attain a point below that of the intersection of the Sutro tunnel with the Comstock lead. Whether another water stratum exists in the 800 to 1,000 feet of hot, unexplored region of rock lying between our present lower levels and that point on the lead which would be cut by the Sutro tunnel no man can know.

The Petroleum Trade.—During the week ending September 19, the following vessels sailed from Philadelphia with petroleum: Bark Ariel, for London, with 86,423 gallons; bark Mary Bentley, for Dunkirk, with 119,847 gallons; brig James Miller, for Ancona, with 69,657 gallons; steamer Star of the Union, for Havana, with 2,500 gallons; bark Advance, for Cork, with 189,343 gallons; making a total of 467,770 gallons for the week and 27,562,677 gallons since the 1st of January, 1868.

The Bowling Green Water Works.

Fully alive to the spirit of progress so fully developing our State, the citizens of Bowling Green formed a company, and are at work to erect water works. The necessary bonds were issued by the corporation and the bonds promptly cashed by her monied men, so that one of the important parts of the work is already accomplished. Under the supervision of Charles Hermaney, Esq., the efficient engineer of the Louisville water works, plans and surveys were made, the work advertised for and let. The fact of Mr. Hermaney having charge and supervision of the plans and erection of the work is sufficient guarantee for the successful completion of the same. The awards for the work, made on the 12th Sept., are as follows:

Dennis Long, of the Union Foundry, the engine and pumping machinery, stop-gates, and fire hydrants.

Dennis Long, of Louisville Pipe Works, all the water pipes.

Higgins & Barry, of Bowling Green, excavating for engine-house, trenching and back-filling for pipe-laying, and earthwork for reservoir.

Jordon & McLellan, stone-work for engine-house.

J. D. Tracy, Bowling Green, bricklaying.

John Cowling, of Jeffersonville, Indiana, carpenter's work.

The reservoir for the Bowling Green Water Works will be built on College Hill, and water brought to the same from the beautiful and picturesque Barren river. The machinery, etc., will be fully up to the times, and in every respect ample for the city and her future growth.

We congratulate the citizens of Bowling Green on their enterprise, and commend to the citizens of our other cities now without such a *desideratum* of comfort and safety her example and liberality. We also feel a pride in stating the fact that we have in our "Falls City" manufacturers well able to compete with any in the country, both as to prices and quality of the work.—*Louisville Journal.*

Writing on a Screen.

By Professor Albert R. Leeds, of Haverford College, Pa.

Every lecturer has felt how unsatisfactory it is to write or draw, or in any manner attempt to illustrate his ideas in a large room. This difficulty may be overcome in the following manner:—A plate of glass is placed in the lime-light or magnesium lantern, and an inverting prism is put in the forward part of the draw-tube of the objective. If now, while looking and lecturing to the audience, writing is done with an ordinary pen and indian-ink upon the glass plate, and proceeding from left to right upon the plate, it will advance correspondingly upon the screen, and will be read in greatly enlarged characters by those present. The square prism inverts with respect to bottom, and the writing being actually reversed by the writer in reference to the other direction in which the lantern is pointing, the crossing of the rays produced by the lens becomes in this case an advantage, and corrects the letters upon the screen. A collodion film, blackened by exposure to the sun's rays, may be substituted for a naked glass plate to great advantage. On such a film chemical and mathematical formulæ, drawings of apparatus, machinery, crystals, anatomical delineations, etc., may be cut with the utmost delicacy, and appear as intensely bright white lines on a black ground, and with something of the appearance of an immense copper-plate engraving.

Solar Engines.—It is announced that Capt. John Ericsson, of Monitor fame, has discovered a method of utilizing the sun's rays so as to employ them as a motive power. At the late centennial anniversary of the Swedish University of Lund, Capt. Ericsson made a communication that, as a result of his experiments, he was able to construct three "solar engines," of which the first was driven by steam formed by the concentration of the heat of the solar rays, and the other two by the expansion of atmospheric air, heated directly by concentrated radient heat. He stated, that such is the enormous development of solar heat, that an area of ten feet square on the sun's surface will drive a real steam engine of 45,984 horse power, domanding a consumption of more than 100,000 pounds of coal every hour. Captain Ericsson's experiments, it is alleged, show that the concentration of solar heat on ten feet square (or 100 square feet of surface) develops a power exceeding one horse power. The exact nature of the concentrating mechanism invented by Ericsson is not made public, but so thoroughly convinced of its practicability is Mr. Delameter, the proprietor of the well-known Delameter Ironworks, that he declares, in a late scientific publication, that "before the termination of the present season bread will be prepared from flour ground by the power of the solar engine."—*Mining Register.*

Correspondence.

Correspondents in all cases should sign their communications with their names and address in full, not necessarily for publication, but as a guarantee of good faith.—Eds.

Communication from "Out West."

THE YIELD FROM CLAY RETORTS.

On Board the Steamer "City of St. Paul," Near La Cross, Wis., Sept. 6th, 1868.

Messrs. Editors: In article No 6 of the "Practical Management of Gas Works," Mr. Smedberg there states that it has been his experience "that iron retorts delivered the largest amount of gas during the first hour of the charge, and clays the largest during the second." As our experience with iron retorts has been very limited, we cannot say much about them; but with reference to clays we may state to you that we have invariably got the largest amount of gas during the first hour of the charge, when our benches were at our usual working temperature. We find in our note-book two experiments made Feb'y 16th and 17th, 1865. These were made to show the capacity of our retort-house provided certain alterations were made on the benches we then had. Our note reads that all charges were ordered off by 7, A. M., on the 16th, and to be careful that benches Nos. 5 and 6 were about the usual working temperature. The charges were off, but the note reads again that No. 5 was low, and No. 6 very low as compared with our usual working heats, and in a parenthesis the reason for this state of things is given, which is that the 15th was pay-day. However, it appears we decided to go on with the experiment, which gave the following results. Owing to the low temperature of the benches we charged 2012 lbs. instead of 2400 lbs, two-thirds Westmoreland, and one-third Cannel coal.

First hour	3,030 cubic feet.
Second hour	3,100 cubic feet.
Third hour	2,200 cubic feet.
Fourth hour	910 cubic feet.
	9,240 cubic feet.

Yield, 4.56 cubic feet per lb.

On the evening of the 16th we again gave orders to have all charges off by 7, A. M., on the 17th, and our note of experiment No. 2 reads as follows: All benches being struck off we took standing of meter, and charged No. 4 bench with 1350 lbs., No. 5, 1250 lbs., No. 6, 950 lbs., making in all 3500 lbs.; two-thirds Westmoreland, and one-third Cannel coal. It is noted that the heats were good and that the difference in the height of charges was owing to the size of the retorts in the different benches. It is also noted that the heats were higher when struck off than when charged.

First hour	6,130 cubic feet.
Second hour	4,510 cubic feet.
Third hour	3,710 cubic feet.
Fourth hour	2,240 cubic feet.
	16,590 cubic feet.

Yield, 4.74 cubic feet per lb.

We will now give you the results of an experiment made March 31st, 1868, which we think will show that a larger yield per hour and also per lb. of coal can be got from clay than from iron retorts. It is noted in this experiment that the heats were good, and that the coal was the best in the shed, clean, dry and free from slack. Charged three retorts with 930 lbs. Youghiogheny coal from the Youghiogneny Coal Hollow Company. F. H. Hubbell, Superintendent—meter taken every thirty minutes:

First 30 minutes	980	cubic	feet.
Second "	770	"	"
Third "	670	"	"
Fourth "	650	"	"
Fifth "	570	"	"
Sixth "	530	"	"
Seventh "	400	"	"
Sixty minutes	330	"	"
	4900		

Yield, 5.930 cubic feet per lb.

Having been called away, the meter was not taken at the four hours, but there was very little gas made after that time. We have been travelling around lately, and of course when in the vicinity of gas works, always find time to make a visit; and, from what we see, are not at all astonished at the small yield many of the companies get. Indeed, to us it is a wonder they can make both ends meet. Their settings are imperfect and as a consequence their heats so poor, it appears to be the idea with many that they must keep the heat in the fire-box or furnace, instead of allowing it to have free access at once to all parts of the oven. We often see settings with the side walls of the furnace so drawn in at the top that there is less ovening than the opening in the grate-bars. We once tried this plan. We were afraid of the action of the fire on our retorts, but sixteen years' experience with a fire box 10 ins. at the grate-bars and 18 ins. at the top has given such results as we were satisfied with. We know there are many of our gas friends who do not credit the facts stated in regard to the large yield;—while there are others who believe it can be done, and are putting their shoulders to the wheel. Among those we may mention the intelligent and energetic superintendent of the Lafayette (Ind.) Gas Works, William Wallace, Esq., in a personal interview recently, told us that his yield was now 4.76 and 4.80 cubic feet per lb. with we think a rather inferior coal to what we are using. There are others we know of who will be heard from ere long. Such facts as these will have a tendency to waken up some of our ancient friends, and also some who do not think themselves quite so ancient. We are near the end of our journey, and must conclude for the present.

Out West.

Gas Fire.

Brooklyn, September 25, 1868.

Messrs. Editors: As you solicit information of inventions that have any relation to the particular branch to which your Journal is devoted, allow me to encroach upon your space for the purpose of describing a new invention called the gas-fire. Apparently it is one of the old-fashioned back-logs, on which several sticks burn brightly: the whole being supported by a pair of hand-irons, such as were in use twenty or thirty years ago. In reality it consists of one piece of fire-brick, colored so as to represent wood. In length it is about two feet, and about half as wide. The small sticks are perforated by a number of little holes, through which the gas escapes and ignites. The gas that it uses is conveyed by a separate pipe to the fire-place, where it is put. A small crank is used to regulate the fire, so that you may have a bright warm fire or a small one, as you please. It is the most perfect imitation of a wood fire that I have ever seen. Indeed, so brightly does it blaze, that people have often been seated around it for a whole evening without discovering the deception. Its advantages may be seen at a glance. In the first place there is a great saving of labor. The grate fire, which it is designed to supersede, requires coal to be carried from the cellar to third and fourth stories. After that labor is required in starting it, and besides, it needs constant attention. In the gas-fire there is no fuel required to be carried or stored; no labor in starting—and as for attention, it would burn a whole day without any one touching it. It also makes no dust or ashes, and hence is admirably adapted for the drawing-room or parlor. It is also comparatively inexpensive, costing, I believe, about seven or eight cents an hour. Besides the heat, it also gives out light strong enough to read by, and the addition of another burner would illuminate the room very brightly. They are imported from France, and is altogether a great improvement over the old grate-fire.

H. C. Hazen, 12 Livingston st.

Taxes on Small Gas Works.

Le Roy, September 19, 1868.

Messrs. Editors: I see by your Journal that an effort is being made to relieve small gas companies of paying the revenue tax, which I hope may be accomplished, and think it can be with the combined influence of the gas companies. Other manufacturers have been relieved from paying said tax, that could much better afford to do so than most or all of the small gas companies. If all manufacturers paid a tax I should be willing to pay, but as others are relieved why should not we, who can so poorly afford it, make an effort to be also relieved. We must co-operate, and will use all our influence for the success of the movement.

A Superintendent.

McKenzie's Patent Gas Process.

Tiffin, Ohio, Sept. 8th, 1868.

Messrs. Editors: Your article on McKenzie's process for gas-making arrested my attention, as I happen to have experimented with it during the "Kirby-Smith" raid on Cincinnati. I made gas for this city during 30 or more days without coal, having run out for want of transportation. I used any carbonaceous material I could lay hands on, even to pork, and, among the rest, crude petroleum. I did not mix with coal, for I had none, but with coke-dust and coke; the latter of course absorbed more freely than coal, but I found the men had hardly courage to put on the lids on account of the heat and fierceness of the flames from the mouth of the retort (iron, and heats poor.) I then tried tan bark damp, but with very little better results.

I admit I used the oil more freely than Mr. Sabbaton, perhaps 15 lbs. to the charge, for they were soon burned out and replaced. The objection, however, was so serious, that I have not repeated the experiment, but will do so in the manner directed. Yours, etc.,

Machinist.

Smedberg's "Synopsis of Gaslighting."

The following subscriptions to the above work are acknowledged, making in all 196.

Gideon Fordham, Sup't Le Roy Gas Co., N. Y.

Fodell's System of Bookkeeping.

The following subscriptions to "Fodell's System of Book-keeping for Gas-Light Companies" have been received, making in all 30:

M. K. Lancaster, Williamsport, Pa.

John M. West, Philadelphia.

The Rondout and Kingston Gas-Light Company.

THE COMPANY FURNISHING GAS FREE FOR TWELVE YEARS.

Quite a sensation was created in Rondout, N. Y., on Wednesday, Sept. 9th, by the discovery that one of the main pipes of the Company had been tapped, and that the Company had, for an indefinite number of years, been furnishing a large quantity of gas without receiving any pay therefor. We learn the following particulars of the matter from the Rondout *Freeman:* "It seems that the company had missed gas for some years and had instituted searches for a leak but without success. One day last week, however, Mr. Turner, the agent of the Company, had his suspicions aroused that some building was supplied with their gas through Von Beck's meters. In order to satisfy his suspicions, he turned off the gas at Von Beck's gas-works. He found no gas in any of the stores or offices in the Masonic Hall building, nor in Fred. Weber's saloon, but on applying a match in the Madison House bar room and telegraph office in the same building the gas burned brilliantly. As those burners were theoretically supplied from the same source as those which would not give any light, the agent naturally thought there was a screw loose somewhere, and communicated his discovery to the Vice-President of the Company, S. D Coykendall, who immediately ordered that the pipes should be unearthed. Laborers were accordingly set to work and a pipe leading from the Company's main pipe into the Mansion House was disclosed, the fact also being revealed that the Company was and had been supplying gas without receiving any remuneration for it.

"When or by whom the tapping had been done it is impossible to tell, it only being known that during the cold term of last winter the lights in the Mansion House burned freely, while the Masonic Hall stores were reduced to lamps and candles. But the Company think the tap was made a dozen years ago, and will claim a large sum, probably $5,000 or $6,000. A suit of law will probably grow out of the affair, and until then the public must patiently await the disclosure of all the facts."

The Oxyhydrogen Light.

M. Caron (commandant), has published a memoir on the composition of a gaseous mixture serving for the oxyhydrogen light, and a new material to be substituted for the magnesia cylinders. He has found that these latter cannot resist, indefinitely, the intense heat produced by the combustion of ordinary coal gas mixed with oxygen. This volatilization of the magnesia may be due to the formation of reduced magnetism, which M. M. H. Deville and Caron found to sublime very easily. (This is the process now most in vogue for purifying this metal). Considering that, in order to obtain the greatest light, the gaseous mixture should always contain an excess of hydrogen, the combustible and the reducer, M. Caron made experiments in which he measured the quantities of the two gases (pure hydrogen and oxygen), and fully demonstrated the above fact. When substances oxydized at a maximum, but capable of being reduced to a minimum by hydrogen, are exposed to high temperatures, and under the same conditions of the composition of the gases, we are certain to find, after extinction, that the portion of the pencil or cylinder, exposed to the flame, has been converted into an inferior oxide. Thus, for example, titanic acid, heated in oxygen to the highest temperature, does not melt; but submitted directly to the flame of a lamp (containing an excess of hydrogen), it melts immediately, and yellow as it has been, becomes blue and sometimes black. A very curious phenomena is also remarked. In regulating the gases so as to obtain the maximum of light, a burst of sparks proceed from the crayon, similar to those produced by iron burning in oxygen. This is, in fact, the titanic acid, reduced at first, but re-oxydized afterwards in the midst of air and aqueous vapor. The shower of sparks ceases immediately on slightly increasing the supply of oxygen. The tungstic, niobic, and tantalic acids possess equally this fusibility, even in a high degree, for when heated to a white heat in a platina crucible, by means of a Schlæsing blowpipe, they always melt if the flame contains an excess of hydrogen. They crystalize on cooling, and become discolored. The titanates, tungstates, etc., with a magnesium base, also melt and turn black in the oxyhydrogen flame; all these substances are thus unsuited for lighting purposes. Silica, alumina, and the refractory earths melt and give out light. After examining the effects of glucinium, the oxides of chromium, of cerium and of lanthanium, M. Caron tried silicate of zirconium, of which he knew the infusibility; but as he expected, the pulverized and agglomerated zircons gave very little light (which happens, in general, with all the silicates). He resolved to try zircon. According to Berzelius, this earth has the property of being infusible, and giving out a light of dazzling brilliancy in the flame of a blowpipe. This, M. Caron found to be true, and he has employed the same crayon in the flame of the oxyhydrogen jet, without the least sign of wear, volatilization, or even partial reduction. This is very important, for the incandescent matter must remain always at the same distance, and if the pencil wore away, the distance would increase and the light diminish.

The use of zircon in the oxyhydrogen light, is a valuable discovery, for, in addition to its being unalterable, the light is superior to that of magnesia in the proportion of six to five. Though, at present rare, zircon exists in many volcanic sands, and in great abundance in the zirconean rocks near Mark, in the environs of Ilmeusea, at the foot of the Ural mountains

M. Caron has also found a very simple method of economising the substance, by only applying the zircon to that portion of the crayon exposed to the flame; the rest can be made of magnesia or even refractory clay. By compression the zircon adheres to the other substance, and burning adds to the solidity of this adhesion. Zircon crayons are made in the same manner as those of magnesia.—*Jour. Franklin Institute.*

Decrease in the Natural Supply of Coal Oil.

In view of the fact that nearly all the oil springs in the country are showing signs of exhaustion, the question whether the natural supply of rock oil will be still further diminished, or entirely cut off in the future, is an important and interesting one, not only to a large number of manufacturers and dealers, but to the public at large. In this connection, the *Evening Telegram*, speaking of this matter, says: A trade worth millions of dollars and giving employment to 50,000 men, in an article which contributes so largely to the comfort and welfare of the civilized world, being used as an illuminating agent, as fuel, as medicine, etc., and entering largely into various manufacturers, cannot be interrupted without inflicting injury on many other interests. The natural supply of coal oil has rendered its manufacture from coal, etc., needless, but leaves the refining machinery still at work, and multiplies the stills and vats. The quantities of crude oil produced by nature are astonishing. Professor Lesley, of the University of Pennsylvania, says that the Empire Spring sent up its oil to a reservoir three hundred feet above the level of its mouth. The Philippi well yielded at first three thousand barrels of oil daily, while many others around it were yielding fifty to five hundred barrels each per day. The Excelsior well flowed five hundred barrels per day for several months. The wells on Oil Creek alone, at their best, produced at the rate of over four thousand barrels daily, or more than one and a half millions per annum. In estimating the magnitude of the supply it is well to take into consideration the fact that the entire production of the whale fishery of tht world, in one of its most prolific years, was not quite four hundred and thirty thousand barrels of sperm and whale oil together.

The force with which new borings often permit the deep set reservoirs of oil and gas to evacuate themselves, would seem itself to indicate the physical impossibility of its continuance, and experience has shown that all the older wells slowly but surely diminish their supply. A writer in describing the old Freedom spring in Cattaraugus county, New York, says that a well was dug fourteen feet deep, within eighteen feet of it, which afforded at first a large supply of oil, but soon the old and the new springs died away together. This is the case in other localities; none of the old sa t wells of the Sandy, the Kanawha, the Monongahela, Conemaugh, Allegheny, Beaver, and Muskingum valleys have been retained in full working condition except by being deepened from time to time. The boring being carried further down every few years, new supplies of brine and oil and gas have been the consequence. The uncertainty of the supply is, however, better illustrated in the history of the famous Oil City, with which our readers are familiar, some of them no doubt to their cost. The fiercest spouting wells of a few years ago have become comparatively quiet, and so has the blowing of their owners. When a comparison with other regions of the world is instituted the same conclusion is arrived at. The original five hundred springs on the Irrawaddy in Indiana now yield less than 100,000 gallons per annum. Cases of sudden exhaustion sometimes occur where wells beginning to blow off gas become entirely unproductive in a day or two, and it is asserted that in nearly every case of conflagration the burning well, as if internally injured, has ceased its yield of oil. On the other hand, old wells exhausted and abandoned have sometimes been seemingly refreshed by rest and again become profitable.

Novel Application of Asphalte.

The repellent property of alphalte bitumen with regard to water, which is so characteristic that samples of natural asphalte, though they contain much mineral matter, scarcely ever yield by moisture to analysis, has already led to its use for lining water tanks and cisterns which are not required to hold boiling water. Now, however, it is proposed to use it for canals as an economical and very desirable substitute for the ordinary puddling. But we need scarcely observe, it is only the best description of Seyssel asphalte that would answer the purpose in a satisfactory manner, and remain water tight for any length of time. Instead of a great thickness of argilaceous material, called puddle, which is not always at hand, and only applied with great labor and expense, the bed of the canal would have to be lined with Seyssel asphalte to the thickness of about one inch and a quarter.

The application of asphalte to canals would doubtless help to keep the water they contain in a pure state, and do away with that stagnant mud in which weeds of the coarsest description flourish and impede the progress of the barges, while it in hot weather gives rise to fœtid emanations as soon as the water sinks a little below its highest level.

For this purpose the artificial asphalte, which is nothing more than gas tar mixed up with calcereous grit and sand, would not be found adequate, as it cannot be expected to afford a durable or even surface. The necessity of employing natural asphalte for this and other purposes, instead of various artificial mixtures intended to imitate it, has been recently insisted on by an eminent engineer, who states that economy and durability are "only assured when the asphalte has a natural source like that shipped to London in large quantities from the mines of Pyrimont Seyssal, in the Jura mountains." These mines have been worked by the Seyssal Asphalte Company since the year 1838, the period at which the late Captain Claridge introduced their product to England, and are still, we understand, far from being exhausted.—*Scientific Review.*

PATENT CLAIMS.

Pertaining to Gas, Water, etc.

82,080.—Apparatus for Domestic Manufacture of Gas.—John W. Brown, Wooster, Ohio.

I claim, 1st. The retort, D, in combination with a gas apparatus adapted to domestic use, and as described, constructed substantially as set forth.

2d. The arrangement whereby the apparatus is made self-regulating, by the pressure of the gas in the gasholder, substantially as shown and described.

3d Using the surplus gas as fuel, either under the retort for generating gas, or for other purposes, by the automatic arrangement, substantially as described.

4th. In combination with a gas apparatus, the water and tar receptacle G, and purifier K, when the same are constructed and arranged substantially as described.

5th. The rake I, in the retort, substantially as and for the purpose set forth.

82,151.—Illuminating Oil.—John E. Noyes, New Albany, Ind.

I claim the within-described burning fluid, compounded and prepared substantially as described.

82,225.—Water Wheel.—John Hoyt, Hughsonville, N. Y.

I claim an outward discharge water wheel, constructed as described, namely, having a top plate B, inverted cone F, buckets d d, and rim D, all constructed and arranged in relation to each other, substantially as herein described.

82,238.—Illuminating Damper.—John H. Keyser, New York city.

I claim, 1st. The door A, constructed with openings, h, and mica holding ribs g g', substantially as described.

2d. The mica holding plate D, interposed between door A, and plate B, substantially as described.

3d. Providing an illuminated door or window for a stove with fixed mica lights d, and movable mica lights d', substantially as described.

82,231.—Attachment for Gas Burners.—Julius Kopp Hoboken, N. J.

I claim an adjustable cap A, constructed of woven or perforated metals, with flanges A'' A''' A'', substantially as and for the purpose set forth as an article of manufacture.

82,224.—Apparatus for Carureting Air.—J. T. Plass and R. H. Plass, New York city

We claim, 1st. The gate E, in combination with the fluid trap, c2, constructed as described, for regulating the supply of hydrocarbon to the evaporizing chamber, and returning the surplus to the reserve chamber, substantially as set forth.

82,249.—Gas Burning Furnace for Steam Generators.—John T. Rice, Phila., Pa. Antedated July 16, 1868.

I claim, 1st. So arranging a furnace that the coal should be subjected to distillation before it enters the fire box, and at the same so arranging the draft or blast that the gases thus evolved shall be thoroughly mingled with atmospheric air or air and steam within the furnace, but before entering the fire box or combustion chamber to be consumed, substantially as described.

2d. The chute, C, extending in the form of a tube into the fire chamber and serving as a retort, for the purpose of distilling the coal retained in the tube by means of the heat of the fire box, in combination with a draft pipe F F' substantially as set forth.

3d. The steam blast, so arranged in relation to the tube or retort in which the coal is subjected to distillation, that the wet steam and atmospheric air shall be mingled with the gaseous products of the coal entering into the fire box, substantially as set forth.

4th. The arches or diaphragms G, when constructed of a refractory substance, and extending entirely across the fire box, and perforated with openings K, substantially as and for the purpose set forth

5th. Double perforated arches or diaphragms G, in combination with intermediate openings P, through the external walls.

6th. The combination of the chute C, extending into the fire box, to act as a retort in the distillation of the coals, and arches or diaphragms G, so located within the fire box as to reflect the heat upon such retort, substantially as set forth.

7th. The steam blower, constructed with concentric funnels, N, extending successively from the center, one beyond the other, and discharging the currents passing between them into a tubular extension F of the outer case, substantially as set forth.

Foreign Gas Items.—The Sunderland Gas Company have declared a dividend of 4½ per cent. for the last half-year....A meeting of gas consumers has been held at Black Heath. The meeting was informed that the Rowly Regis and Black Heath Gas Company are unwilling to grant a reduction except to the smaller class of consumers, who would in future be charged 6s. ($1.50) instead of 9s. 6d. ($1.82) per 1000. The reason assigned by the directors was, that the shareholders had not received sufficient remuneration for the money invested. The meeting was unanimous in the opinion that it was bad policy on the part of the directors to expect to increase the dividends of the shareholders by continuing to charge so much for their gas, and expressed themselves unwilling to pay such a high price. It was decided to discontinue burning gas at the end of the quarter, unless the price be reduced to 4s. 6d. ($1.12) per 1000 feet... A mode of lighting by gas, to which General Favre has called the attention of the Emperor, is being tried in Paris. The gas is self-made, and the apparatus easy to manage and move about. It is said it can be used for heating purposes as well.

A New Light.—Professor Carlevaris, of Genoa, has invented a new light. It is an oxy-hydro-magnesian flame, and is obtained by placing in the flame of a mixture af hydrogen, or coal gas, with air or oxygen, spongy magnesia, a substance of very small cost. The flame is white, rich in actinic force, fixed, and developing less heat than other lights. The expense is very trifling, a light equal to four wax candles, only costing two-tenths of a penny per hour.

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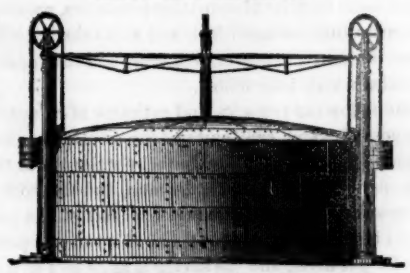

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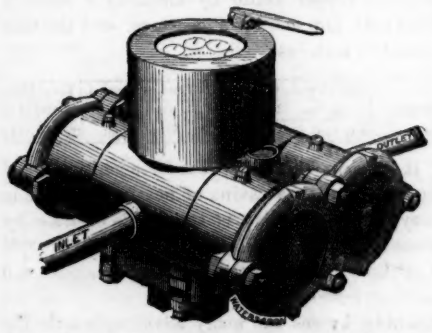

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FRIDAY, OCTOBER 2, 1868.

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CONTENTS

Beggs' Gas Regulator..... 97
Desulphurizing Coal..... 98
On Some of the Constituents of Coal Gas..... 98
Interesting Experiment with Hydrogen..... 98
Observations upon the Combining Powers of Carbon. 99
A Very Pretty Experiment. 99
New York Society of Practical Engineering..... 99
Heat in Mines..... 100
The Petroleum Trade..... 100
Bowling-green Waterworks. 100
Writing on a Screen 100
Solar Engines..... 100
CORRESPONDENCE—
The Yield from Clay Retorts..... 101
Gas Fire..... 101
Taxes on Small Gasworks 101
McKenzie's Patent Gas Process..... 101
Smedberg's Synopsis of Gas-lighting..... 101
Fodell's System of Bookkeeping..... 101
Rondout and Kingston Gas-Light Company..... 101
The Oxyhydrogen Light.... 102
Decrease in the Natural Supply of Coal Oil..... 102
Novel Application of Asphalte..... 102
Patent Claims..... 102
Foreign Gas Items..... 102
A New Light 102
Answers to Correspondents. 104
EDITORIALS—
Some Data About Gas.... 104
Economy in Gas 104
Water Meters the Only Safeguard Against Public Calamity..... 105
Jefferson City Gasworks.. 105
Editorial Items..... 105
Miscellaneous Items..... 112
Death of the Discoverer of Ozone and Gun Cotton... 119
Platinum Gaslight Perfecter 112

Answers to Correspondents.

C. J. F., of N. J.—Paraffin and olefiant gas are identical in composition—both containing the same amount of carbon and hydrogen.

C. A. O., of Ind.—Clay retorts usually leak for a short time of being used, owing to the porosity of the material of which they are made. The pores, however, soon become choked up with carbon, and little or no loss afterwards ensues.

H. S., of N. Y.—Of course a glass shade or globe being interposed between the flame of a gas-light and the object it illuminates must intercept a large portion of the luminous rays.

L. E., of Pa.—The Philadelphia Gas Works were constructed in 1835. On February 8th, 1836, they commenced the manufacture of gas, and on the 10th of the same month the public lamps in some of the streets were lighted. Only 15 retorts were then in use.

A. J. T., of Md.—Your fears are entirely unfounded, for there is no danger whatever. We are unsparing in our denunciations of burning fluid, but the oil you speak of, if purchased from the parties you name, may be relied on with perfect confidence.

O. P., of Vt.—You are right. The calculation is a very simple one, based upon the well known law—the intensity of light varies immensely as the square of the distance.

L. J. E., of Pa.—We do not see how the ascension pipes can become clogged, if care is taken to clean them every time the retorts are opened. There must have been some inattention on the part of the stokers.

W. H. D., of C. W.—We have a very high opinion of Bower's Glycerin for wet meters. It will remain fluid in any degree of cold to which it may be exposed in your latitude.

E. D., of S. C.—To make cement impermeable by air and steam, which is said to be superior to any in use for steam and gas pipes, take six parts of finely powdered graphite, three parts of slaked lime, and eight parts of sulphate, are mixed with seven parts of boiled oil. The mass must be well kneaded until the mixture is perfect.

SOME DATA ABOUT GAS.

The importance which ordinary coal gas has obtained aside from its illuminating properties, namely, as a substitute for solid fuel, and as a substitute for steam for a motive power, will make interesting any statistics which may follow.

The following remarks and estimate of comparative cost of wood, coal and gas for boiling a gallon of water is taken from Dr. Letheby's Report to the Commissioners of Sewers, London, and the cost is expressed in English money. The cost of the gas, it will be observed, is about one-third of the price paid for gas here; and the saving is as 3½ to 1 in money. So the same experiment here, at the present price of gas, would leave a margin in favor of gas, as to cost, and a saving of two-thirds in time. But when we consider that the apparatus used was far less economical in utilizing heat compared with the improved gas cooking apparatus we have at present, a still more favorable margin for gas will appear.

Dr. Letheby says: "In addition to the advantages which gas presents as a means of economical illumination it is also very applicable in many circumstances as a cheap and extremely convenient substitute for ordinary fuel. . . . The following statement, which was the result of many experiments, shows the relative cost of boiling a gallon of water in a copper kettle by means of a recently lighted coal fire, and by a gas stove, and the time required in each case.

	Coals Used.	Wood used.	Time employed.	Total Cost.
With fire...	4⅘ lbs.	1-24th of 1d.	One hour.	77-100 of 1d
With gas...	4 c. f. at 4s. 6d. per 1000		20 minutes.	22-100 of 1d

"It appears, therefore, that for such occasional purposes, there is a saving of nearly 3½ to one in money, and an economy of two-thirds on time, by the use of gas, in addition to the saving of trouble in lighting the fire, and the avoidance of smoke and dust."

Cooking by gas has many advantages over the common fire. Fire for cooking for ten persons requires considerable time in preparation. Gas, on the contrary, is lighted and applied instantly; whilst fire, after the cooking is finished, is often allowed to go to waste, or makes the kitchen disagreeably hot. Gas is extinguished as instantly as it is lighted; is much cleaner, and leaves no ashes, cinders, or dust. If sulphuretted hydrogen be injurious to health, as is often urged, gas is healthier than a coal fire, and meat is not tainted by it. All meat and food cooked by gas retain a better flavor. Having considered coal gas, we will now take hydrogen.

STANDARD OF HEAT.

The standard by which heat is measured is the unit of heat, which is that quantity which will raise 1 lb. of water 1 degree Fahrenheit; therefore, to raise 1 lb. of water from 32° to 212° Fahrenheit will require 180° or units of heat. Now, it has been ascertained that the perfect combustion of coals will generate 12,000 units of heat; 1 lb. of carbon, 14,000 units of heat, and 1 *lb. of hydrogen* 62,000 *units of heat.*

If we take coal gas of the specific gravity of ·420, of 12 candle-power, then 1 lb., equal to 30 cubic feet in volume, will be equal to 28,000 units of heat, and hydrogen carburetted in place of air, as by the Rand process, to 22 candle-power, will give about 40,000 units of heat to the pound.

In the best constructed furnaces, grates, stoves, etc., where coal is used for fuel, more than three-quarters of this heat is lost; but solid fuel will give place to this cleanly, convenient and wonderfully cheap gaseous fuel, made as it is from the two cheapest elements in nature—anthracite coal and water, at a cost of about 25 cents per 1000 cubic feet.

This gas, being free from carbon and other impurities, is peculiarly well adapted to be used in gas engines as a motor, and it may not be too visionary to assert that steam, with its trouble, danger, and expense, will give place to the more ethereal element, hydrogen, as a source of power on account of its wonderful convenience, perfect safety from explosion, and economy when properly manufactured and introduced in a commercial manner.

This is being done by the "Gwynne-Harris" process, which we have previously described. The various patents now being owned by the National Coal Gas Company, who, under the management of their energetic president, Horatio P. Allen, Esq., are introducing this new process to the attention and for the benefit of the various gas companies, who can employ the hydrogen to largely increase the yield of illuminating gas by utilizing more of the hydrocarbons of the coals, which in the ordinary process of manufacture is lost in the tar, etc., in the hydraulic main, or deposited in a solid form in the retorts as "gas carbon."

ECONOMY IN GAS.

As the season of winter approaches consumers of gas naturally look forward to the period when their bills for light will be greatly increased. Few persons are acquainted with the chemistry and art of lighting by gas, and with what constitutes economy in its use. The majority of consumers are ever disposed to be hostile to gas companies. Many incline to the erroneous belief that they are charged with more of the hydrocarbon vapor than they actually consume, while perhaps there is not a company to be found that would wilfully make up a bill for a larger amount than was actually indicated by their meter. But an advocacy of gas companies is not here intended.

In general the complaints of consumers are directed against the quantity of gas for which they are charged, rather than against the quality of the gas itself. That the consumption by individuals might be greatly reduced there is no doubt. By judicious management and a proper gas-regulator their bills could be reduced. To effect a saving the gas companies and their consumers must unite. The custom prevails very generally among great numbers of gas consumers, when gas bills are high, to reduce the consumption, as they suppose, by turning on less quantities at the meter, or burners, without any reference to the pressure exerted on the gas, or the velocity of its current as it rushes through the burners. They cut off a part of the gas current, and therefore suppose their bills will be much reduced, until the month comes round and they discover that the claim is of the usual magnitude. In the meantime they have enjoyed but an imperfect light, and therefore presume that they have been overcharged, or that the gas is of an inferior quality.

Ordinary coal gas consists of two measures of hydrogen and one of carbon, and is known as carburetted hydrogen. With this gas there is sometimes mixed bicarburetted hydrogen, having two measures of hydrogen and two measures of carbon. The specific gravity of the former is 0.559, of the latter 0.985, air being 1000. With these gases there are others present which precipitate no carbon while burning, such as hydrogen, carbonic acid, etc. These diminish the light. The more carbon the gas contains the greater will be the light, provided a sufficient quantity of oxygen or air be admitted to the flame to produce perfect combustion of the hydrocarbon compound.

The gas of New York must first be elevated, and

to supply it all all levels it is submitted to pressure to force it downward, even beneath the line of the retorts in which it is generated. The pressure necessary to force the gas to the lowest points of its destination is far too great for higher situations, where it frequently rushes through the burners with a whistling noise and a force altogether incompatible with giving light. The gas companies have employed the ordinary means to adjust the flow of gas throughout the city; but it is perhaps next to an impossibility to regulate the flow and pressure in such a manner that every consumer shall have the quantity and the force he requires to obtain light with the greatest economy. A high pressure is necessary to secure a sufficient supply and overcome the friction of the gas in the innumerable mains, pipes, and burners

It will, then, appear quite evident that the flow and pressure of gas should be controlled and regulated in every building where it is consumed. If this advice were adhered to, it would prove advantageous to the gas companies and consumers, and bring to a peaceful termination the conflicts now so common between them. There is a satisfaction in knowing that, while in the enjoyment of retirement at "our ain fireside" with a brilliant light over our shoulder, we are wasting nothing, while we receive a due share of the incomparable advantages of gas-lighting.

WATER METERS THE ONLY SAFEGUARD AGAINST PUBLIC CALAMITY.

From the very able manner in which this subject was treated at a meeting of the New York Society of Practical Engineering in August last, in a paper read by Mr. Whitney, the president of the meeting, "On Water Meters and their Uses," we are again induced to agitate this much needed safeguard against the reckless and wanton waste of water by our citizens.

We do not propose to write a homily on the subject, but to impress upon the minds of the Commissioners of the Croton Aqueduct, upon whom the powers are conferred and with whom the remedy lies, that this waste must be abated. These gentlemen are personally and officially responsible to the people of this city for an adequate and constant supply of water. They are bound by their oath of office to fulfil this trust. They are severally and individually responsible for all waste and damage which may result from this neglect or omission to throw around the priceless treasure in their keeping every safeguard within their reach—as much as would be the custodian of a bank, neglecting to secure its vaults by bars and bolts. We speak of their liability morally, of course.

We therefore call upon these gentlemen to avail themselves of the alternative left to them by applying meters at once to the largest outlets to regulate, or at least to ascertain the actual consumption, that some calculation may be made of the requirements which to this day have not been fully met.

We therefore trust that at least a beginning may be made in this reform—a reform in which every good citizen will co-operate cheerfully.

JEFFERSON CITY GAS WORKS.

The Jefferson City Gas-Light Company have, we learn from the New Orleans *Picayune*, awarded to Dennis Long, Esq. proprietor of the Louisville Pipe Works, the contract for building the gasholder and furnishing all the pipe and other necessary castings for the works—lamp-posts, purifiers, etc. The work to be furnished on the new contract will amount to over $50,000. Jefferson City, Louisiana, claims to have a population of 20,000, which is rapidly increasing, and while, it is said, business and property in New Orleans is on the downward move, in Jefferson City property has enhanced in value fully 25 per cent.

Mr. Long's foundry and shops are now busily engaged on work for gas and water companies of many of the cities of the West and South;—his establishment is very complete. The local papers justly say that this speaks well for Louisville and for her manufactures, being an evidence of her ability to compete with the largest cities in the country.

EDITORIAL ITEMS.

☞ In this number will be found a report of the proceedings of the New York Society of Practical Engineering, which is interesting and instructive. We have furnished our readers with the reports of all the previous meetings, and they have, no doubt, been well perused. In this connection we would ask those who can conveniently attend the meetings to do so, feeling they would derive much information therefrom, and be enabled to contribute in a measure to the interest and usefulness of the Society.

Cornell University.—The following Professors of the Cornell University, Ithaca, N. Y., were elected on Sept. 16th:—Rhetoric and oratory, H. B. Sprague, principal State Normal School, Conn; general and agricultural geology, Prof. C. Frederick Hartt, of Vassar College; botany and horticulture, Prof. A. N. Prentiss, of Michigan Agricultural College; director of shops, John L. Morris, of Ovid. The university opens October 7th.

☞ We publish the last installment of the instructive lecture delivered by Dr. Odling before the British Association of Gas Managers, which has, doubtless, been read with interest by the fraternity. Why cannot the American managers organize such an association? We hope our patrons will strive their utmost to consummate this long-talked-of and desirable object; and when the proposed convention of gas-engineers takes place, it will be the time to perfect a similar organization.

The Elevated Railway.—The Board of Aldermen of this city have adopted a resolution directing the Corporation Counsel to commence proceedings against the Elevated Railway Company, to recover damages for injuries done to Greenwich-street property, in consequence of the erection of the elevated railway on that street, and also directing the Street Commissioners to remove the same forthwith.

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AN ENGINEER OF MANY YEARS' EXPERIence in the Construction and Superintendence of Gasworks desires a situation as Superintendent, either to build or superintend Gasworks of any size;—is acquainted with all the modern improvements. Best of References. Address

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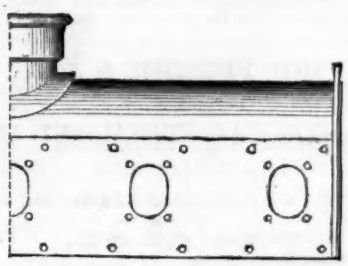

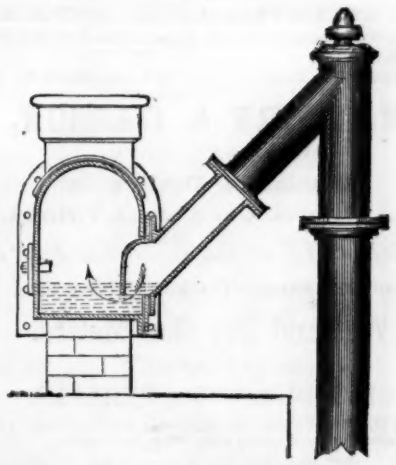

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We are entirely satisfied with the "Robbins' Patent Joint" for connecting our street mains. R. SALTER, Superintendent,
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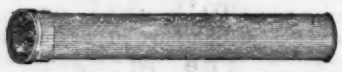

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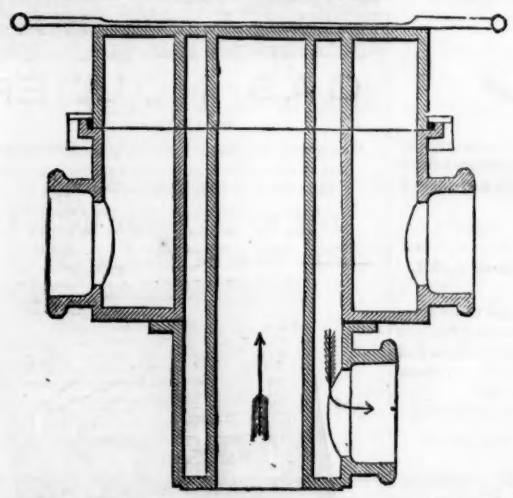

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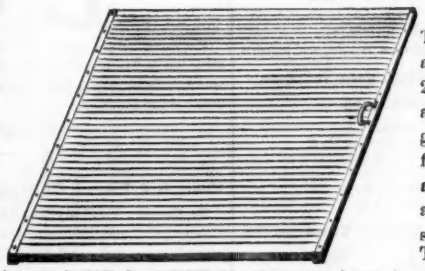

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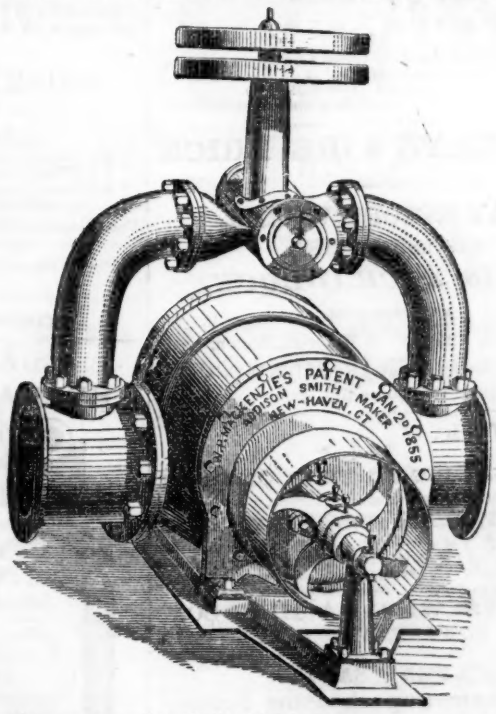

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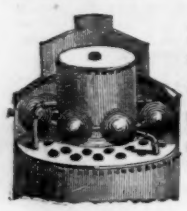

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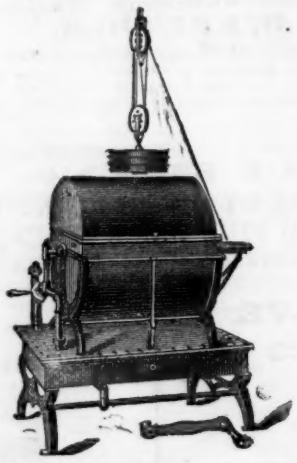

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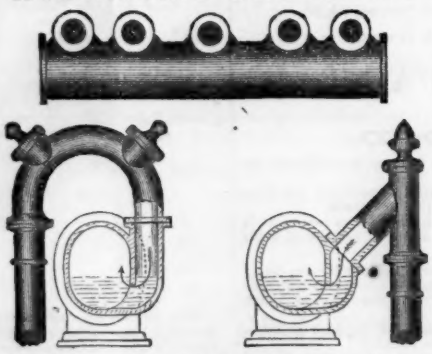

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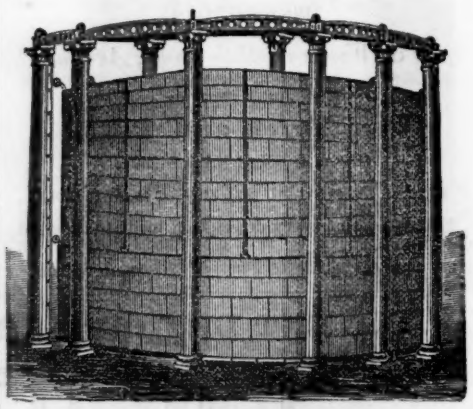

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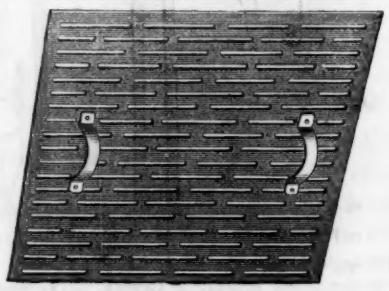

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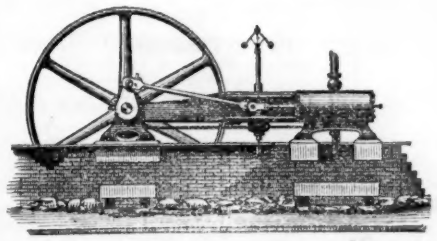

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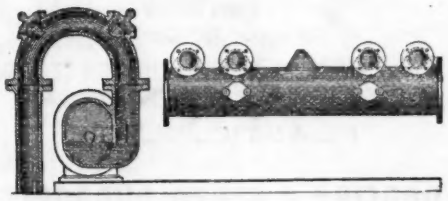

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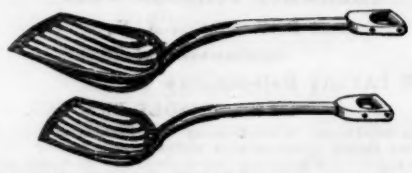

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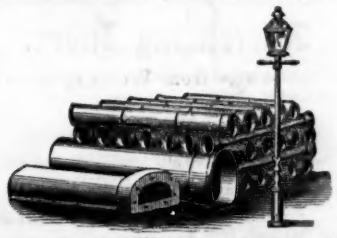

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San Jacinto Saturday, Nov. 3
San Salvador .. " 10
San Jacinto .. " 17
San Salvador, .. " 24

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ALSO

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Miscellaneous Items.

—Russia will soon have the Black Sea and the Baltic in direct railway connection. This was a long contemplated project, and will not only develop her commerce but enormously increase her defensive power.

—The highest mine in the world is a silver mine, and is that of Potosi, in the Andes of Peru. It is situated 11,375 feet above the surface of the ocean. The deepest mine in the world is a salt mine. It is the so-called new selz werk in Westphalia, and is 2,050 feet below the surface of the ocean.

—The *Meadville Republican* says the recent strikes in the Shenango valleys, among the coal miners, have made a difference of over half a million dollars in the business of that region, have reduced the earnings of the railways and canal a quarter of a million, and have affected the lake trade and the country immediately interested in the mines more than half a million dollars more. All this loss is the work of a few ringleaders, who ought to have been arrested or driven from the country.

—The distances overland are as follows: From Omaha to Cheyenne 515 miles; from Cheyenne to Denver and Golden City 111 miles; from Cheyenne to Salt Lake 535 miles; from Salt Lake to Lake's Crossing, on the Truckee 499 miles; from the Truckee to Sacramento 119 miles; making a total distance between Omaha and San Francisco of 1,792 miles.

—Work on the canal across the Isthmus of Suez is still progressing. The sum of $57,600,000 has already been expended upon it, and the total cost when it is finished will, it is estimated, be $90,000,000, or perhaps, including the necessary docks at each end, $100,000,000. About sixty miles of it is now used for winter transit.

—Late advices from Alaska are very encouraging. Coal mines have been discovered near Sitka, on the mainland. The quality is considered unequaled, and the seam is over twenty feet wide and traceable for some distance. The coal was tried on the United States steamer "Saginaw" and pronounced excellent. It has the appearance of pure anthracite, and is superior to any Lehigh coal. In addition to this discovery, Alaska is likely to become a place of fashionable resort in hot weather.

—The Erie Railway Company, it is stated, have contracted for the enormous quantity of 8000 tons of steel rails, a portion of which have arrived, the remainder to be delivered during this summer. It is proposed by the company to relay at once such portions of its lines as are subjected to the greatest service, but ultimately to dispense with iron rails altogether. The work of substituting the steel ones has already been commenced, and the indications are that by the return of winter the work will be completed, and the whole line placed in good condition.

Death of the Discoverer of Ozone and Gun Cotton.—The London *Builder* contains the following remarks concerning the discoveries of Dr. Schonbein, whose name is famous in connection with the discovery of ozone and gun cotton, and whose demise we briefly noticed in our last issue:—"He was born at Mitzingen, in the kingdom of Wurtemburg, in 1799, and was consequently in his seventieth year. He made the discovery of gun cotton somewhere about thirty years ago. He disposed of his interest in the invention to Baron Lenk, who, after years of research and experiment, made the explosive manageable. Lenk spun the cotton and wove it into fabrics suited for cartridges. Prentice & Sons, who hold the patent in this country, adopted his plan, but now make the gun cotton into paper, which is rolled up for cartridges. Collodion, the solution of an imperfect gun cotton in ether, became a valuable application in surgery, and afterwards became the film on which glass photographs were taken. Schonbein had then lost all interest in its development, and was busy with experiments in allotrophy, which led to the discovery of ozone. He had observed certain atmospheric effects accompanied by a peculiar odor, and research led to the discovery of ozone, which he pronounced to be oxygen in a different condition. The subject was one of intense interest to the chemist, and he worked at it till his death. Sanitary science, which had many a tough problem to solve, seems likely to have the path smoothened in no small degree by the discoverer of ozone."

The Platinum Gas-light Perfecter.

Mr. John Scholl, of London, has lately brought out a cheap and useful article which he calls the "Gas-light Perfecter," the placing of which over an ordinary fish-tail or other gas burner increases the brilliancy of the light to an extraordinary extent. As adapted for fish-tail and bat's-wing burners, the perfecter consists of a short brass tube or cap, which is split in order to enable it to grip the exterior of the burner when applied, and diametrically across one end of this tube there is secured a thin strip of platinum, placed edgewise. This cap is to be placed upon the burner so that the lower edge of the platinum strip may rest close upon the top of it, and, in the case of a fish-tail burner, exactly between the holes, so that it may be in the middle of the flame lengthwise. In the case of a bat-wing burner, the strip should be parallel with but not immediately over the slit; and when an argand burner is used, the strip is made of an annular form, and provided with spring clips to fit the inside of the burner. The annular strip or platinum should be so adjusted as to conform to the series of holes, and be situated just sufficiently to one side thereof not to actually impede or obstruct the exit of the gas. From experiments we have made on an ordinary fish-tail burner, consuming two and a half feet of gas per hour, and giving the light of six candles, we find that the addition of the perfector to the same burner increases the light obtained to nine candles. An important saving in gas is thus obtained, and, in addition, the perfecter causes the whole of the gas to be consumed; hence all unpleasant smell and the whistling from unequal pressure is prevented. We have no hesitation in recommending the "Gas-light Perfecter" to the notice of all gas consumers.—*Practical Mechanics' Journal.*

[We refer those who have made enquiries about this improvement to H. M. Raynor, 748 Broadway, who is agent for the same.—Eds.]

Advertising Index.

☞ In looking for advertisements, see figures 1 to 9, within brackets, at head of advertisement pages.

GAS-BURNERS, APPARATUS ETC.

Arnold's Metallic Gas Trays—T. G. Arnold, 334 and 336 West 21st street, N. Y. ... 6
American Meter Company, 512 West 22d street, New York ... 8
Automatic Gas Purifier—State Rights for sale—Wm. C. Turnbull, care of T. C. Babcock, 59 Broadway, or office of the American Gas-Light Journal ... 2
Builder of Gas Works, Apparatus, Etc.—P. P. Delly, 39 Laurel street, Philadelphia ... 6
Contractors for Gas-works, Etc.—Murray, Baker & Walker, Fort Wayne, Ind ... 2
Cambridge Gas Stoves, Ranges, &c.—Gas Light Journal Offices, 8
Gas Coals—Bird, Perkins & Job, 104 Wall street, New York ... 4
Gas Engineers and Contractors—Hoy, Kennedy & Co., 111 Liberty street, New York ... 4
Gas-Burners—C. Gefrorer, 529 Commerce street, Philadelphia, Pa ... 9
Gas Meter Manufacturers—Harris & Bro., 1117 Cherry street, Philadelphia, Pa ... 8
Gas Superintendent—C. M. Cresson, 417 Walnut st., Phil., Pa ... 9
Gas Apparatus, &c.—Geo. H. Kitchen & Co., 561 Broadway ... 9
Gas Burners—Wightman Bros., 25 Kilby st., Boston, Mass ... 9
Gas Burners—T. G. Arnold, 224 and 226 West 21st st., N. Y. ... 9
Gas Burners—W. Anderson, cor Franklin & Elm sts., N. Y ... 8
Gas Works for Sale—Colonel J. A. Sabbaton, Manhattan Gas Works, N. Y ... 8
Gas Stoves—A. L. Bogart, 792 Broadway ... 7
Gas Fixtures, Meters, Etc., Etc.,—McHenry & Carson, Cincinnati, Ohio ... 4
Gas Fixtures & Chandeliers—Alfred Bliss & Co., 95 Bleecker-st., New York ... 2
Gasometers, Etc—George Stacey & Co. Cincinnati, O ... 6
Gasoleine,—J. W. Wheelock, 284 Pearl st., New York ... 4
Gas-works of London—D. Van Nostraud, 192 Broadway ... 8
Haskins' Gas Stoves—A. Bliss & Co., 95 Bleecker-st., N. Y ... 8
Plumbers, Gas and Steam Fitters—Moore & Gaussen, 221 West Fifth street, Cincinnati, O ... 6
Patent Gas Exhauster—Smith & Sayre, 484 Broadway ... 5
Purifying Trays—Jno. L Cheeseman, 147 and 149 Ave. C, N.Y. 2
Robbins' Patent Joint for Gas and Water Pipes ... 4
Solar Gas Machines—W. S. Drake, 18 Dey street ... 6
Stanley's Hydraulic Main, Etc.—L. F. Whiting, Boston ... 6

FOUNDRIES.

Brooklyn Tube Works—B. T. Benton, Brooklyn ... 9
Bergen Iron Works—Driving Pipes and Bands—R. A. Brick, 109 Leonard street, N. Y ... 7
Columbian Iron Works—Wm. Taylor & Sons, 11, 13 and 15 Adams street, Brooklyn, N. Y ... 7
Cast Iron Pipes and Fittings—B. S. Benson, 52 East Monument street, Baltimore, Md ... 1
Continental Works—T. F. Rowland, Greenpoint ... 6
Dealers in Iron, Copper, Brass, etc.—T. Cassidy & Co., corner of Bridge and John streets, Brooklyn, N. Y ... 4
Erie Basin Iron Works—Elizabeth, Dwight and Van Dyke sts., South Brooklyn, N. Y ... 2, 7
Louisville Pipe Works—Dennis Long, Cor. 9th and Water-sts., Louisville, Ky ... 9
Manufacturing Enamelers—Nessle & Taylor, 97 Water street, Brooklyn, N. Y ... 7
National Foundry and Pipe Works—Wm. Smith, Carroll, Pike, Smallman and Wilkins streets, Pittsburgh, Pa ... 7
Oregon Iron Foundry—Herring & Floyd, 738, 740, 742 and 744 Greenwich street, New York ... 3
Pascal Iron Works—Morris, Taskar & Co., Philadelphia, Pa ... 9
Southwark Foundry—Merrick & Sons, Fifth and Washington streets, Philadelphia ... 9
Wrought Iron Pipes, etc.—Joseph Nason & Co., 61 Beekman street, New York ... 4

WATER METERS, PUMPS, ETC.

Ashcroft's Low-water Detector, 50 John street, New York ... 6
Aubin Water Meter—H. Q. Hawley, Albany, N. Y ... 7, 9
Babcock & Wilcox's Stationary Steam Engines ... 8
Davis' Steam Superheating Boiler—Duplex Steam Boiler Mf'g Company, Long Island City, N. Y ... 9
Pat. Lead-Encased Tin Pipes—Colwells, Shaw & Willard, foot of West 27th street, N. Y ... 4
Patent Dry Centre Valve—American Meter Company, 512 West 22d street New York ... 5
Steam Pumps—H. R. Worthington, 61 Beekman st. New York ... 7
Water Pipes, etc.—S. Fulton & Co. 207 North Water st Phila ... 9
Water Closets, etc.—Wm. S. Carr & Co. 149, 151, 153, 155, 157 Centre street, New York ... 4
Water and Sewerage Pipes—Am. Water and Gas Pipe Company northwest corner of Green and Bay sts., Jersey City, N. J ... 5
Worthington's Water Meters—H. R. Worthington, 61 Beekman street, New York ... 2
Woodward Steam Pump Mf'g Co. 76, 78 Centre st. New York ... 9

CLAY RETORT WORKS.

B. Kreisher, Clay Retorts, Etc., 58 Goerck street, New York ... 5
Bay State Clay Retort Works, 125, 127 Water st. Boston, Mass ... 6
Brooklyn Clay Retort Works, Van Dyke st. Brooklyn, N. Y ... 5
Jersey City Fire Brick Works.—J. H. Gautier & Co., Greene, Essex and Bergen streets, Morris Canal Basin, N. J ... 5
Laclede Fire Brick Works, 1007 North Levee, St. Louis, Mo ... 8
Manhattan Clay Retort Works, 15th st. near Av. C, New York ... 5
Philadelphia Fire Brick Works, Vine and 23d sts. Philadelphia ... 5
Retorts, Pipes, &c.—R. D. Wood & Co., 400 Chestnut street, Philadelphia ... 9

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Mining Engineer—J. H. Tiemann, 240 Pearl st. New York ... 4
Sodium Amalgam &c.—Prof. Wurtz, 26 Pine st., New York ... 6
School of Mines, Columbia College, East 49th st. " ... 2
J. S. Phillips, Mining Engineer, Wadsworth House, San Francisco, Cal ... 4

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Chimney Top—C. H. Reichmann, 45 Fulton st. " ... 7
Lamps—F. H. Lovell & Co 238 Pearl street, New York ... 7
Street Lamps—J. G. Miner, Morrisania, Westchester Co., N.Y. ... 2
Lamps, &c.,—Julius Ives & Co., 49 Maiden Lane, N. Y ... 9

MISCELLANEOUS.

A Rare Opportunity for Investment—Offices of this Journal ... 3
Apparatus For Sale—Washington (D. C.) Gas Company ... 6
Bird Cages—Osborn Manufacturing Company, 109 Bleecker st ... 8
Cameron Coal Company—42 Broadway ... 1
Despard Coal ... 1
Empire S. S. Line for Savannah, Garrison & Allen, 5 Bowling Green ... 9
Empire Sewing Machine Company, 294 Bowery ... 6
Fire Extinguisher—U. S. Fire Extinguisher Co., 8 Dey street ... 9
Finkle & Lyon Sewing Machine Company, 581 Broadway ... 9
Fodeli's "Book-keeping for Gas Companies" ... 2
Gas-Light Journal American and Foreign Patent Agency ... 8
New and Second-hand Boilers, etc.—Fryer, Bros., 508 and 510 West 24th st., N. Y ... 3
Opposition S. S. Line to California—177 West st., cor. Warren ... 9
Prince's Metallic Paint—D. Sloan & Co. 115 Liberty street ... 5
Plastic Slate Roofing Co. 157 Broadway ... 8
Pianos—Raven & Bacon, 644 and 646 Broadway, N. Y ... 9
Partner Wanted—Wm. Bent, Medina, Orange County, N. Y ... 8
Platinum—Vessels, Apparatus, Sheet-wire, etc.—H. M. Raynor, 748 Broadway, N. Y ... 3
Pattern and Model Makers—Fryer, Bros., 508 W. 24th st. N.Y. 3
Roofing Materials—E. Van Orden & Co. 41 Liberty st ... 4
Rubber Goods—O. B. Gray, 201 Broadway ... 4
Smedberg's "Synopsis of Gas-Lighting" ... 2
Situation Wanted as Manager of a Gas Work ... 3
Steam Cooking Apparatus—Bennett, Johnson & Co., 42 Dey st., New York ... 6
Sabbaton's Patent Screening Shovels—A. T. Smithe, No. 126 Maiden Lane, New York city ... 8
Smith & Sayre Manufacturing Company, 95 Liberty street ... 5
Situation as Superintendent Wanted—Sup't Office G. L. Jour ... 2
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Treatise on the Manufacture of Gas—D. Van Nostrand, 192 Broadway, New York ... 8
Ventilation—Henry A. Gouge, 254 Broadway ... 6
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☞ All communications to be addressed to "The Editors," No. 22 Pine Street, New York.

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